

## PATENT COOPERATION TREATY

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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 0035-ET-PCT	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US01/24587	International filing date (day/month/year) 02 August 2001 (02.08.2001)	Priority date (day/month/year) 03 August 2000 (03.08.2000)
International Patent Classification (IPC) or national classification and IPC IPC(7): B32B 9/00; C30B 29/32 and US Cl.: 117/949; 428/697,699, 700, 701,702		
Applicant MICROCATINGS TECHNOLOGIES, INC.		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>3</u> sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of <u>1</u> sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of report with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>		
Date of submission of the demand 31 January 2002 (31.01.2002)	Date of completion of this report 18 September 2002 (18.09.2002)	
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer <i>B. Hauden</i> Deborah Jones Telephone No. 703-308-0661	

**I. Basis of the report****1. With regard to the elements of the international application:\***

- ☐ the international application as originally filed.
- ☒ the description:  
pages 1-8 \_\_\_\_\_ as originally filed  
pages NONE \_\_\_\_\_, filed with the demand  
pages NONE \_\_\_\_\_, filed with the letter of \_\_\_\_\_.
- ☒ the claims:  
pages NONE \_\_\_\_\_, as originally filed  
pages NONE \_\_\_\_\_, as amended (together with any statement) under Article 19  
pages NONE \_\_\_\_\_, filed with the demand  
pages 9 \_\_\_\_\_, filed with the letter of 16 AUGUST 2002 (16.08.2002)
- ☒ the drawings:  
pages 1 \_\_\_\_\_, as originally filed  
pages NONE \_\_\_\_\_, filed with the demand  
pages NONE \_\_\_\_\_, filed with the letter of \_\_\_\_\_.
- ☐ the sequence listing part of the description:  
pages NONE \_\_\_\_\_, as originally filed  
pages NONE \_\_\_\_\_, filed with the demand  
pages NONE \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

**2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.**

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☒ the elements marked above were available or furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

**3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:**

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

**4. ☒ The amendments have resulted in the cancellation of:**

- ☒ the description, pages NONE
- ☒ the claims, Nos. NONE
- ☒ the drawings, sheets/fig NONE

**5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\***

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.  
PCT/US01/24587**V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. STATEMENT**

Novelty (N)	Claims <u>1-16</u>	YES
	Claims <u>NONE</u>	NO
Inventive Step (IS)	Claims <u>1-16</u>	YES
	Claims <u>NONE</u>	NO
Industrial Applicability (IA)	Claims <u>1-16</u>	YES
	Claims <u>NONE</u>	NO

**2. CITATIONS AND EXPLANATIONS**

Claims 1-16 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a  $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$  formed as a layer on the C-plane of a sapphire substrate, wherein x has a value of 0 to 1.

Claims 1-16 meet the requirement of industrial applicability as defined by PCT Article 33(4), because the claimed invention has applicability in the electrical and optical device fields.

----- NEW CITATIONS -----

## What is Claimed:

1. A material comprising epitaxial  $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$  formed as a layer on the C-plane of a sapphire substrate, wherein  $x$  has a value from 0 to 1.
2. The material of Claim 1 wherein said layer is between about 100 and about 3000 nanometers thick.
3. The material of Claim 1 wherein said layer is between about 300 and about 1000 nanometers thick.
4. The material of Claim 1 wherein said  $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$  has a 111 orientation.
5. The material of Claim 1 wherein said  $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$  is doped with an ion or ions that change its properties.
6. The material of Claim 5 wherein said doping ions comprise cesium and bismuth.
7. The material of claim 1 further comprising conductive electrodes for applying a bias or RF signal to the  $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$  layer.
8. A material comprising epitaxial  $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$  formed as a layer on a sapphire substrate, wherein  $x$  has a value from 0.1 to 0.9.
9. The material according to Claim 8 wherein  $x$  has a value from 0.3 to 0.7.
- ~~10. The material according to Claim 8 wherein  $x$  has a value from 0.4 to 0.6.~~
11. The material of Claim 8 wherein said layer is between about 100 and about 3000 nanometers thick.
12. The material of Claim 8 wherein said layer is between about 300 and about 1000 nanometers thick.
13. The material of Claim 8 wherein said  $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$  has a 111 orientation.
14. The material of Claim 8 wherein said  $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$  is doped with an ion or ions that change its properties.
15. The material of Claim 14 wherein said doping ions comprise cesium and bismuth.
16. The material of Claim 8 further comprising conductive electrodes for applying a bias or RF signal to the  $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$  layer.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/24587

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC(7) :B92B 9/00; C80B 29/32 US CL :117/ 949; 428/697, 699, 700, 701, 702 According to International Patent Classification (IPC) or to both national classification and IPC																				
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) U.S. : 117/ 949; 428/697, 699, 700, 701, 702  Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) West USPAT, JPO, DERWENT																				
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>																				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																		
X	US 5,624,707 A (AZUMA et al.) 29 April 1997, entire document.	1, 3-5, 7 and 9																		
X	US 5,612,082 A (AZUMA et al.) 18 March 1997, entire document.	1, 3-5 and 9																		
X	US 5,572,052 A (KASHIHARA et al.) 05 November 1996, col. 6, lines 50-68 and col. 10, lines 1-68.	1-5 and 9																		
X	US 5,132,282 A (NEWMAN et al.) 21 July 1992, col. 6, lines 39-60.	1, 3-4																		
Y		5																		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.																				
<table border="0"><tr><td>* Special categories of cited documents:</td><td>"T"</td><td>later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td></tr><tr><td>"A" document defining the general state of the art which is not considered to be of particular relevance</td><td>"X"</td><td>document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td></tr><tr><td>"B" earlier document published on or after the international filing date</td><td>"Y"</td><td>document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td></tr><tr><td>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td><td>"&amp;"</td><td>document member of the same patent family</td></tr><tr><td>"O" document referring to an oral disclosure, use, exhibition or other means</td><td></td><td></td></tr><tr><td>"P" document published prior to the international filing date but later than the priority date claimed</td><td></td><td></td></tr></table>			* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"B" earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family	"O" document referring to an oral disclosure, use, exhibition or other means			"P" document published prior to the international filing date but later than the priority date claimed		
* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention																		
"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone																		
"B" earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art																		
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family																		
"O" document referring to an oral disclosure, use, exhibition or other means																				
"P" document published prior to the international filing date but later than the priority date claimed																				
Date of the actual completion of the international search 15 OCTOBER 2001		Date of mailing of the international search report 27 DEC 2001																		
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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US01/24587

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	JP 11031921 A (TSUZUMI et al.) 2 February 1999, Abstract.	1, 3 and 9 ----- 4 and 5
X --- Y	WO 91/14028 (NEWMAN et al.) 19 September 1991, entire document.	1, 3 and 4 ----- 5
X --- Y	EP 0630424 B1 (DESU et al.) 28 December 1994, entire document.	1 and 7 ----- 4 and 5

